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Precision electroweak physics with polarized beams at SuperKEKB

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Summary

Consideration is being given to upgrading the SuperKEKB e^+e^- collider with polarized electron beams, which would open a new program of precision electroweak physics at the $Y(4S)$. These measurements include $\sin^2 \theta_W$ obtained via left-right asymmetry measurements of e^+e^- transitions to pairs of electrons, muons, taus, charm and b-quarks. The precision obtainable at SuperKEKB will match that of the LEP/SLC world average but at the centre-of-mass energy of 10.58 GeV, thereby probing the neutral current couplings with unprecedented precision at a new energy scale sensitive to the running of the couplings. World average measurements of the individual neutral current vector coupling constants to b- and c-quarks and muons in particular will be substantially improved and the residual 3σ discrepancy between the SLC ALR measurements and LEP AFBb measurements will be addressed. This paper will include a discussion of the necessary upgrades to SuperKEKB. This program opens an exciting new window in searches for physics beyond the standard model.

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